

Notice of Allowability

Application No.

09/862,916

Examiner

Mark Ruthkosky

Applicant(s)

MAYES ET AL.

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 9/7/2004.
2. ☒ The allowed claim(s) is/are 8-35.
3. ☒ The drawings filed on 22 May 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 9/7/2004
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Mark Ruthkosky 12/7/2004
Mark Ruthkosky
Primary Patent Examiner
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DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 9/7/2004 has been placed in the application file, and the information referred to therein has been considered as to the merits.

Foreign Search Report

The foreign search report submitted on 3/1/2004 has been considered. The report indicates that the corresponding claims are novel and unobvious.

Allowable Subject Matter

Claims 8-35 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to a polymer electrolyte comprising a non-cross-linked association of a plurality of block copolymer chains each block copolymer chain including at least one ionically conductive block and at least one second block immiscible with the ionically conducting block; the electrolyte is amorphous and non-glassy through the entire range of about 0-70 °C; the chains have an ordered nanostructure including a continuous matrix of amorphous domains defined by association of ionically conductive blocks providing continuous ionically conductive pathways and amorphous second domains immiscible with the ionically conducting domains defined by association of second blocks. The prior art does not teach a block copolymer with a non-cross-linked association of a plurality of block copolymer chains each

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block copolymer chain including at least one ionically conductive block and at least one second block immiscible with the ionically conducting block, wherein the electrolyte is amorphous and non-glassy through the entire range of about 0-70 °C. Further, the prior art does not teach that the ionically conductive block is defined to be of the materials taught in the instant application to lack the crystallinity and glassification as claimed, (see page 16, lines 17-30 for examples.)

The most pertinent prior art includes Armand (5,523,180), which teaches a polymer electrolyte that is a block copolymer comprising an ionically conductive block and a second block rigid block. It is noted in col. 1, lines 15-60, that polyethylene oxide is known to give an amorphous, conductive electrolyte. The materials may be non-crosslinked or crosslinked as shown in the examples. Precipitation and evaporation methods for forming electrolytes are noted in the examples. An anion is immobilized on the polymer electrolyte and a counter cation is included (see col. 2, lines 13-65). The anion can be immobilized on either block; for example block A may be polyethylene oxide which incorporates a salt and block B may be an acrylate derivative of ionic groups, (See col. 2, lines 50-65 and col. 5, lines 25-35). The cation will be in the ionically conductive block to balance the charge of the anion. Metal salts are noted, including lithium (col., 5, lines 25-35 and various examples.) Branched polymers with the ionically conductive portion consisting of polyethylene glycols are noted in col. 3, lines 15-65, and various examples. Acrylates and methacrylates are noted in col. 2, lines 10-end. Glycidyl acrylates ($T_g = -41.5^\circ\text{C}$) and methacrylates are noted in col. 2, lines 40-50. Polyethylene glycols with monomer weights of up to 20,000 are noted in col. 3, lines 45-end.) A separate electrolyte salt and conductive liquids such as polyethylene glycol and methyl ethers may be added (col. 5, lines 25-45). The weights of the copolymers are on the order of greater than 10^5 (see col. 1, line

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33.) The materials are used in lithium batteries. The electrolyte is not taught to be non-glassy and amorphous over the entire claimed range. In addition, the electrolyte does not include the materials of the instant invention (see page 16 of the instant application, for example) that lack crystallinity and glassification over the claimed temperature range. It cannot then be an inherent property of the materials to be in an ordered nanostructure including a continuous matrix of amorphous domains defined by association of ionically conductive blocks providing continuous ionically conductive pathways and amorphous second domains immiscible with the ionically conducting domains defined by association of second blocks. As the prior art does not teach the electrolyte as claimed, the instant claims are allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments, filed 3/1/04, with respect to claim 1 have been fully considered and are persuasive. The rejections of the claims based on Armand (US 5,523,180) have been withdrawn. With regard to the applicant's arguments noting cross-linking, Armand teaches that block B has excellent properties either intrinsically or once a number of segments have been cross-linked. Cross-linking is not required. This is shown in the examples. The copolymer of example 1 is not cross-linked, however the copolymer of example 3 is cross-linked. The block copolymer includes segment A with conducting properties and segment B, which confers

mechanical properties on the copolymer. The first segment is a solvating segment, however and therefore the polymer is not immiscible as the segment solvates the copolymer (col. 2, lines 3-end.) In addition, the reference does not teach the compounds noted in the instant application which the association gives an amorphous and non-glassy copolymer electrolyte through the entire range of at least from about 0-70 °C.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky 12/7/2004

Mark Ruthkosky
Primary Patent Examiner
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